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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/073,215	02/13/2002	Masato Hagiwara	57454-335	4811

7590 05/06/2005

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EXAMINER

ROCHE, TRENTON J

ART UNIT	PAPER NUMBER
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2193

DATE MAILED: 05/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/073,215

Applicant(s)

HAGIWARA ET AL.

Examiner

Trent J. Roche

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 March 2005.
2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-17 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 13 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____

DETAILED ACTION

1. This office action is responsive to communications filed 2 March 2005.
2. Per applicant's request, amended claims 1, 6 and 8 have been entered. Claims 1-17 are pending.
3. Claims 1-17 have been examined.

Response to Arguments

4. Applicant's arguments filed 2 March 2005 have been fully considered but they are not persuasive.

Per claims 1, 2, 4-12, 14, 15 and 17:

The applicant states that Lindholm does not disclose or suggest that AN code can be compressed to conserve memory and then decompressed for interpreted execution, as required by independent claim 1, and further, that the interpreter of Lindholm does not interpret expanded code for execution in non-native code format. While the explicit purpose, "to conserve memory", is not required nor recited in the claim language, Lindholm still discloses that compression of code would be utilized for conserving memory, as noted in col. 7 line 62 to col. 8 line 2, "in order to reduce the space requirements of the RAM...the compression criteria specifies that the code of a compressible method...be compressed at the time when (1) space in the RAM 136 is needed but not available..." Further, Lindholm discloses compression and decompression of code in col. 6 lines 17-19, "the code compressor compresses and decompresses in the RAM the code of the methods..." and finally in col. 8 line 23, "optimal compression of the AN code..." As such, Lindholm clearly discloses compression and decompression of the AN (non-native) code. With regards to the interpreter not

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interpreting the expanded code for execution in non-native code format, Lindholm discloses in col. 6 lines 6-8 that the interpreter does indeed interpret AN (non-native) code for execution. "In particular, the executer interprets the AN code of the methods 147 for execution on the specific architecture..." For these reasons, the rejection of claims 1, 2, 4-12, 14, 15 and 17 are proper and maintained.

Per claims 3, 13 and 16:

Applicant's arguments concerning Lefurgy amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references. As was shown in the prior Office Action, as well as below, Lefurgy discloses the limitations required by claims 3, 13 and 16. The rejection of claims 3, 13 and 16 are proper and maintained.

Claim Objections

5. Claim 8 is objected to because of the following informalities: the phrase 'portion storing' is repeated twice in line 6. Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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7. Claims 1, 2, 4-12, 14, 15 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,794,049 to Lindholm.

Per claim 1:

Lindholm discloses:

- a program execution device of executing a program described in a non-native code format of a prescribed language (Note Figure 2 and the corresponding sections of the disclosure)
- a compressed code storing portion storing a code of said program compressed on a prescribed unit basis (“the code compressor stores in the secondary memory the compressed...code...” in col. 4 lines 1-3)
- an expanding portion connected to said compressed code storing portion for expanding said compressed code stored in said compressed code storing portion (“the code compressor compresses and decompresses in the RAM the code of the methods...” in col. 6 lines 17-19)
- a code storing portion connected to said expanding portion for storing the code expanded by said expanding portion (“the code compressor compresses and decompresses in the RAM the code of the methods...” in col. 6 lines 17-19)
- an interpreter portion connected to said code storing portion for interpreting said expanded code for execution in said non-native code format (“the executer interprets the AN code of the methods for execution...” in col. 6 lines 6-7)

substantially as claimed.

Per claim 2:

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The rejection of claim 1 is incorporated, and further, Lindholm discloses an object oriented language (“programmed in an object-oriented manner” in col. 5 lines 6-7) and the prescribed unit bases being a method as claimed (Note Figure 3, item 316 and the corresponding sections of the disclosure)

Per claim 4:

The rejection of claim 1 is incorporated, and further, Lindholm discloses the prescribed unit being an instruction as claimed (Note the rejection of claim 2, methods are instructions.)

Per claim 5:

The rejection of claim 1 is incorporated, and further, Lindholm discloses a compression mode determining portion as claimed (Note Figure 4, item 410 and the corresponding sections of the disclosure. For the system to decompress the method, it must have a compression mode determining portion, so that it can determine how to decompress the compressed data.)

Per claim 6:

Lindholm discloses:

- a program execution device of executing a program described in an object oriented language, said program being described in a code other than a code native to said program execution device (Note Figure 2 and the corresponding sections of the disclosure. Further, “these programs are written in the Java programming language...in an object-oriented manner” in col. 5 lines 2-7)
- a compressed code storing portion storing a code of said program compressed on a method basis (“the code compressor stores in the secondary memory the compressed...code...” in

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col. 4 lines 1-3. Further, note Figure 3, item 316 and the corresponding sections of the disclosure)

- an expanding portion connected to said compressed code storing portion for expanding said compressed code (“the code compressor compresses and decompresses in the RAM the code of the methods...” in col. 6 lines 17-19)
- a converting portion connected to said expanding portion for converting said expanded code to a native code (Note Figure 3, item 308 and the corresponding sections of the disclosure)
- a native code storing portion connected to said converting portion for storing the native code output from said converting portion (“the code compressor compresses and decompresses in the RAM the code of the methods...” in col. 6 lines 17-19. Further, note Figure 3, item 318 and the corresponding sections of the disclosure)
- a native code executing portion connected to said native code storing portion for executing said native code (Note Figure 4, item 406 and the corresponding sections of the disclosure)
- an interpreter portion for interpreting said expanded code for execution in a non-native code format (“the executer interprets the AN code of the methods for execution...” in col. 6 lines 6-7)

substantially as claimed.

Per claim 7:

The rejection of claim 6 is incorporated, and further, Lindholm discloses a native code storing portion being a cache memory as claimed (“the generated AS code could be cached in the run-time memory...” in col. 2 lines 56-57)

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Per claim 8:

The rejection of claim 1 is incorporated, and further, Lindholm discloses:

- a code storing portion storing a code of a method of said program described in said non-native code format (Note Figure 2, item 147)
- a compressed native code storing portion storing a compressed native code obtained by compressing the native code of the method (Note Figure 3, item 318 and the corresponding sections of the disclosure)
- a first determining portion connected to said native code storing portion for determining if a native code of a desired method is stored in said native code storing portion; a second determining portion connected to said compressed native code storing portion for determining if a compressed native code of said desired method is stored in said compressed native code storing portion (Note Figure 4, item 404 and the corresponding sections of the disclosure. Determinations must inherently be made to determine that AS code is present, and further checking is utilized to determine that the AS code is compressed.)
- a native code storage controlling portion connected to said first and second determining portions, said compressed native code storing portion, said code storing portion and said native code storing portion for selectively executing expansion of the compressed native code stored in said compressed native code storing portion or conversion of the code stored in said code storing portion to a native code and storing the resultant native code to said native code storing portion in accordance with outputs from said first and second determining portions (Note Figures 3 and 4 and the corresponding sections of the disclosure.)

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- a native code compressing and storing portion connected to said second determining portion, said native code storing portion and said compressed native code storing portion for compressing the executed native code and storing it in said compressed native code storing portion in accordance with the output from said second determining portion (Note at least Figure 3, items 318. A determination inherently occurs so as to not re-compress already compressed code.)

substantially as claimed.

Per claim 9:

The rejection of claim 8 is incorporated, and further, Lindholm discloses a compression mode storing portion storing a compression mode of the compressed native code on a method basis (Note Figure 3, item 318 and the corresponding sections of the disclosure), executing expansion of the compressed native code stored in said compressed native code storing portion in accordance with the compression mode (Note Figure 4, item 410 and the corresponding sections of the disclosure), and compressing the executed native code by a compression mode determined by a predetermined method as claimed (Note Figure 3, item 318 and the corresponding sections of the disclosure. A compression mode is inherently determined so that the system can compress the code properly.)

Per claim 10:

The rejection of claim 8 is incorporated, and further, Lindholm discloses compressing with highest priority a native code converted first of methods stored in said native code storing portion as claimed (“the code of each loaded method...for which the predefined compression criteria is satisfied is compressed by the code compressor...” in col. 7 lines 63-65)

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Per claim 11:

The rejection of claim 8 is incorporated, and further, Lindholm discloses compressing a native code having a lowest execution frequency as claimed (“compresses the code of the least recently executed methods...” in col. 8 lines 54-55)

Per claim 12:

The rejection of claim 8 is incorporated, and further, Lindholm discloses compressing a native code having the largest size of methods as claimed (“methods of a specific size...to be compressed” in col. 9 line 67)

Per claim 14:

The rejection of claim 8 is incorporated, and further, Lindholm discloses deleting a compressed native code with a lowest execution frequency as claimed (“the least recently invoked method(s)...with compressed code are flushable and are to be flushed from the RAM...” in col. 10 lines 22-24)

Per claim 15:

The rejection of claim 8 is incorporated, and further, Lindholm discloses deleting a compressed native code with a largest size of methods as claimed (“flushing criteria specifying when the loaded methods are to be flushed...” in col. 10 lines 18-19)

Per claim 17:

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The rejection of claim 8 is incorporated, and further, Lindholm discloses deleting a compressed native code compressed first as claimed ("method(s)...with compressed code are flushable and are to be flushed from the RAM..." in col. 10 lines 22-24)

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 3, 13 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,794,049 to Lindholm, in view of "Improving Code Density Using Compression Techniques" by Lefurgy et al, hereafter referred to as Lefurgy.

Per claim 3:

The rejection of claim 1 is incorporated, and further, Lindholm does not explicitly disclose a prescribed unit being a series of instructions not containing branching in the program. Lefurgy discloses in an analogous code compression system a series of instructions not containing branching as claimed ("we do not compress relative branch instructions..." in section 3.2.1, page 8). As Lefurgy discloses that compression of branch instructions would affect relative branch targets thus requiring a rewrite of codewords, resulting in an NP-complete problem, it would have been obvious to one of ordinary skill in the art at the time the invention was made to not include branch

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instructions in the compression of Lindholm, so as to avoid an NP-complete problem as disclosed by Lefurgy.

Per claim 13:

The rejection of claim 8 is incorporated, and further, Lindholm discloses compression criteria for specifying methods to be compressed (Note Figure 1, items 150, 152 and 154). Lindholm does not explicitly disclose a criteria being a highest compression ratio. Lefurgy discloses that the use of compression ratios were well known to one of ordinary skill in the art at the time the invention was made (Note Eq. 1, page 4). It would have been obvious to one of ordinary skill in the art at the time the invention was made to prioritize code having a highest compression ratio in the system disclosed by Lindholm, as this would minimize the overall size of the code in the system disclosed by Lindholm.

Per claim 16:

The rejection of claim 8 is incorporated, and further, Lindholm discloses deleting a compressed native code based on criteria ("flushing criteria" in col. 10 line 20). Lindholm does not explicitly disclose a criteria being a lowest compression ratio. Lefurgy discloses that the use of compression ratios were well known to one of ordinary skill in the art at the time the invention was made (Note Eq. 1, page 4). It would have been obvious to one of ordinary skill in the art at the time the invention was made to delete code having a lowest compression ratio when running low on memory in the system disclosed by Lindholm, as this would free up more memory space for code having a higher compression ratio, thereby improving and minimizing code size in the system disclosed by Lindholm.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Trent J. Roche whose telephone number is (571) 272-3733. The examiner can normally be reached on Monday - Friday, 9:00 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki can be reached on (571) 272-3719. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Trent J Roche
Examiner
Art Unit 2193

TJR

A handwritten signature in black ink, appearing to read 'TODD INGBERG', with a long, sweeping horizontal line extending to the right.

**TODD INGBERG
PRIMARY EXAMINER**